

## English summary

**Background:** A theoretical framework has hypothesized that physical activity, motor competence and health-related fitness demonstrate reciprocal longitudinal relationships across childhood and adolescence. Additionally, the framework also indicated that health-related fitness mediated the relationships. Substantial research has been published evaluating the framework. However, most studies investigated the relationships individually, not taking into account how components interact and predict later body fatness in children and adolescents. Because poor motor competence may affect health and/or health-related behaviors, it is of interest to analyze how motor competence tracks through childhood and how motor competence interacts with physical activity, physical fitness and body fatness during childhood.

Recently, additional pressure from the society for children to present higher academic performance led to a decrease in the amount of time children were exposed to physical activities at school in several countries. Consequently, the research community increased the focus evaluating the possible association between physical activity, physical fitness, motor competence and academic performance in children. It has been shown that physical activity, physical fitness and motor competence are positively associated with academic performance in children and adolescents. However, most of the evidence was cross-sectional and the few longitudinal studies available have not fully addressed some of the interactions.

**Aim:** The main purpose of the thesis was to analyze motor competence and academic performance longitudinally associated factors in children and adolescents.

In addition, the thesis is composed of three major objectives:

1. Evaluate how well motor competence track over the course of childhood and early adolescence;
2. Evaluate the longitudinal associations among physical activity, motor competence,  $VO_{2peak}$  and body fatness across seven years;
3. Evaluate the longitudinal association between physical activity, physical fitness, motor competence and academic performance.

**Materials and methods:** Studies 1 and 2 were part of the CoSCIS study. Children were monitored three times during seven years of follow-up, at six, nine and thirteen years of age. Physical activity was

measured by accelerometers for at least four days. Motor competence was assessed by the KTK battery.  $VO_{2peak}$  was assessed using a continuous running protocol on a treadmill until exhaustion. The sum of biceps, triceps, subscapular, and suprailiac skinfolds was the measure of body fatness. Studies 3, 4 and 5 were part of the CHAMPS-study DK. Physical activity was measured by accelerometers during seven days. Physical fitness was assessed by the Andersen test, shuttle run, jump height and grip strength. Motor competence was assessed by the balance test and precision throw test. WC was measured with a measuring tape at umbilicus level to the nearest 0.5 cm. The academic performance was the combination of the scores in Danish and Math since 2010 when Denmark's school system started to perform a national standardized test for all the children enrolled in Danish schools.

**Results:** All tracking coefficients were moderate-to-moderately high both in the individual KTK tests and in the MQ-Score. Only the correlation in KTK<sub>BOARD</sub> test between 6 to 13 years was low for the whole sample and both sexes ( $r < 0.30$ ) (Study 1).  $VO_{2peak}$  exhibited direct association with S4SF. However, MVPA and VPA only exhibited mediated association with S4SF via  $VO_{2peak}$  (Study 2). MVPA was only associated with academic performance by WC mediation, and VPA presented total and mediated association with academic performance via WC. SED time was also associated with academic performance (Study 3). During the three-year follow-up the Andersen test, shuttle run, jump height and the fitness latent score were associated with academic performance whereas grip strength was not associated (Study 4). Balance presented total and mediated association with academic performance via WC. Precision throw did not present neither total nor mediated association with academic performance (Study 5).

**Discussion and conclusions:** Future interventions that aim to improve children and adolescents' health should promote physical activity, motor competence and physical fitness concomitantly because a combined intervention should achieve more relevant results in targeting body fatness. Complementarily, the studies 3, 4 and 5 showed that physical activity, motor competence and physical fitness are not only associated with body fatness, but also with academic performance. Therefore, it is clear that the associations observed support a holistic intervention that increases physical activity and fitness level and promote motor challenging activities in which the participants can increase their motor competence would decrease body fatness or waist circumference, and also improve students' academic performance.